

Appl. No. : 10/749,180
Amtd. Dated: January 9, 2008
Reply to Office Action of August 9, 2007

REMARKS

Claims 1-4 were originally pending in the present application. Currently, Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as anticipated by U.S. Patent No. 6,416,904 to Reimers et al. (hereafter "Reimers"). Claims 3 and 4 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Reimers in view of U.S. Patent No. 6,027,835 to Fukumura et al. (hereafter Fukumura). Claims 1 and 2 have been amended to clarify the present invention, while Claims 5 and 6 have been added. Accordingly, Claims 1-6 are now pending and at issue.

Applicant respectfully requests reconsideration of all rejections in light of the above amendments and the following arguments.

The specification was also objected to in the recent Action. Corrections have been made to the specification to address and overcome such objections. Applicant requests withdrawal of these objections.

Claim 1 is has been amended to add the phrase: "in which a starting side of the coated section has a larger protuberance than a finishing side thereof . . ." Support for this amendment can be found at page 11, line 23; page 12, line 13; page 13, line 3; page 15, line 25; and Figs. 1, 2 and 4 of the English specification. No new matter has been added.

New Claim 5 is now added as a dependent claim of Claim 1, stating that the "electrode plate for a battery according to claim 1, wherein a peak of the starting side of the coated section of the second electrode active material layer is set in a position corresponding to an inclined portion in the range from a peak of the starting side to an intermediate portion of the coated section of the first electrode active material layer." Support for this added claim can be found on page 15, lines 20-24 of the English specification. No new matter has been added.

Appl. No. : 10/749,180
Arndt. Dated: January 9, 2008
Reply to Office Action of August 9, 2007

Claim 2 is has been amended by adding the following underlined phrases: "a coating means which is capable of consecutively subjecting one surface and the other surface of the collector to intermittent coating process in the same conveying direction, . . ." "in which a starting side of the coated section has a larger protuberance than a finishing side thereof, . . ." and "consecutively after the step "c" without winding of the collector and stopping." Support for these amendments can be found at page 23, line 26; page 24, line 4; page 3, line 7; page 4, line 4; and page 19, lines 22-23. No new matter has been added.

Finally, Claim 6 was also added as a dependent claim of claim 2, stating that the "production process for an electrode plate for a battery according to claim 2, wherein a peak of the starting side of the coated section of the second electrode active material layer is set in a position corresponding to an inclined portion in the range from a peak of the starting side to an intermediate portion of the coated section of the first electrode active material layer." No new matter has been added by this new claim.

As to amended Claim 1, it is now clearly different from Reimers in that "a starting side of the coated section has a larger protuberance than a finishing side thereof." In Reimers, there is no description that a starting side (leading edge) of an electrode active material layer (segment coating) intermittently formed on a collector has a larger protuberance than that of a finishing side (trailing edge) thereof.

A case where as in the present invention starting sides of electrode active material layers on both sides of a collector have a lager protuberance than finishing sides thereof and the starting sides of the electrode active material layers on both sides of the collector are aligned to have a positional relationship with slight shift is superior in the following points in comparison with the prior arts in which a starting side of an electrode active material layer on one side of a collector

Appl. No. : 10/749,180
Amdt. Dated: January 9, 2008
Reply to Office Action of August 9, 2007

is aligned to have a positional relationship with a slight shift with an ending side of an electrode active material layer on the other side of the same collector. Hence, the present invention has much higher effect to prevent drop or other damage of the electrode active material layer, break or other damage of the collector.

Specifically, in a case that, as in the prior arts, a collector is interposed between two electrode active material layers, wherein one surface has an electrode active material layer with a large protuberance on a certain place which causes big difference in thickness, and the other surface has an electrode active material layer with a lower protuberance or flatness at a position opposing to the large protuberance, at the moment that such a large protuberance is carried through between two press rolls, an exceeding tension is generated in the vicinity of a surface of the collector having thinner electrode active material layer or at the thinner electrode active material layer on the collector. By said tension, there is the possibility that the electrode plate having the layered structure comprised in the order of the electrode active material layer/ the collector/ the electrode active material layer is damaged in such a manner that the collector is extended and broken, or the electrode active material layer is cracked, chipped and dropped due to shift or shear of stress generating in a hard electrode active material layer. These problems are particularly notable, and the above problems are likely to occur on a negative electrode using a copper foil, for instance.

Regarding this point, as in the present invention, in the case when the edges of the starting sides of both electrode active material layers have a positional relationship to face each other with the collector interposed between them, the difference in thickness between the edge on one side and the edge on the other side is smaller than in the case when the edge of the starting side of an electrode active material layer and the edge of the ending side of an electrode

Appl. No. : 10/749,180
Amdt. Dated: January 9, 2008
Reply to Office Action of August 9, 2007

active material layer have a positional relationship to face each other with the collector interposed between them, so that tension applies equally on both sides of the collector upon pressing. Therefore, the present invention has much higher effect to prevent drop or other damage of the electrode active material layer or break or other damage of the collector.

In contrast with this, in Reimers, a leading edge of a first side segment coating of a collector and a trailing edge of a second side segment coating of the collector, the edges being aligned to face each other with the collector interposed between them, are treated identically and it is not considered which edge is applied first on a web. This is shown by the following point. Side views in Figs. 3b-Se of Reimers et al. depict that a leading edge 2a of a segment coating on one side of a web and a leading edge 3a of a segment coating on the other side of the web are faced each other. However, if segments are controlled by a series of coating procedure shown in FIG. 1a and FIG. 2b of Reimers, a starting position of segment coating on one side of the obtained web and an ending position of segment coating on the other side of the same web are aligned. Thus, in fact Reimers only provides an electrode plate in which a leading edge 2a of a segment coating on one side of a web and a trailing edge 3b of a segment coating on the other side of the same web are aligned to face each other.

Also in Reimers, there is no description that the leading edge of a segment coating (electrode active material layer) on a collector has a larger protuberance than that of the trailing edge of the same. By Reimers in which a leading edge and a trailing edge of a segment coating are treated identically, it cannot be expected that the case where starting sides of electrode active material layers on both sides of a collector have a larger protuberance than finishing sides thereof and the starting sides of the electrode active material layers on both sides of the collector are aligned to have a positional relationship with slight shift has much higher effect to prevent drop

Appl. No. : 10/749,180
Amtd. Dated: January 9, 2008
Reply to Office Action of August 9, 2007

or other damage of the electrode active material layer, break or other damage of the collector, in comparison with the prior arts in which a starting side of an electrode active material layer on one side of a collector is aligned to have a positional relationship with a slight shift with an ending side of an electrode active material layer on the other side of the same collector.

Therefore, claim 1 of the subject application is neither predictable nor obvious by Reimers.

As to Claim 2, the method for producing an electrode plate of the present invention is a suitable method for obtaining the electrode plate of the present invention.

The currently amended claim 2 is now clearly different from Reimers on the following points: (1) "a coating means which is capable of consecutively subjecting one surface and the other surface of the collector to intermittent coating process in the same conveying direction," (2) "(forming a second electrode active material layer) consecutively after the step "c" without winding of the collector and stopping," and (3) "forming a second electrode active material layer in which a starting side of the coated section has a larger protuberance, than a finishing side thereof." Reimers states that "The leading edges and trailing edges of the first side segment coatings are thus proximate to the leading edges and the trailing edges of the second side segment coatings respectively;" however, the above-described three unique points are not mentioned in Reimers. Rather, it is natural to suppose that the aforementioned wording in Reimers ("The leading edges and trailing edges of the first side segment coatings are thus proximate to the leading edges and the trailing edges of the second side segment coatings respectively") describes the state of FIG. 3a in the prior art, in which there is no shift (or gap) between the leading edges of the first side segment coatings of a collector and the trailing edges

Appl. No. : 10/749,180
Amdt. Dated: January 9, 2008
Reply to Office Action of August 9, 2007

of the second side segment coatings of the collector, the leading and trailing edges being aligned to face each other with the collector interposed between them.

Reimers explains segment coating on both sides of the web in col. 6, lines 35 to 64, FIG. 1a and FIG. 1b. Firstly, a web is supplied from a supply spool 11, is subject to segment coating on one side and is taken up by a take-up spool 12. Next, the take-up spool 12 of the previous process is used as a supply spool 11 and the other side of the web coated on one side is subject to segment coating. If the coating is controlled in this manner, a starting position of segment coating on one side of the obtained web and an ending position of segment coating on the other side of the same web are aligned.

By Reimers in which a leading edge and a trailing edge of a segment coating are treated identically and it is not considered which edge is applied first on a web, the above-described three unique points are neither predictable nor obvious.

Finally, as to Claims 3 and 4, Fukumura disclose an electrode sheet having coated portions arranged intermittently on both sides, wherein edges of coated portions on both surfaces of a current collector are shifted. However, the above-mentioned coated portions arranged intermittently in Fukumura are formed in such a manner that a peelable tape is preliminarily applied in a predetermined pattern on both sides of the current collector followed by coating which covers the tape and the collector surfaces, thereafter the tape is peeled. Accordingly, a method of intermittent coating is not mentioned in Fukumura.

The present invention solves the problem due to a large protuberance on the starting side of coating by intermittent coating. Fukumura, which does not have such a protuberance at all, does not provide important information to the present invention.

Appl. No. : 10/749,180
Amtd. Dated: January 9, 2008
Reply to Office Action of August 9, 2007

Therefore, claims 3 and 4 of the subject application is not obvious in view of Reimers and Fukumura.

Reconsideration of the rejections, in light of the aforesaid amendments and present remarks, is respectively requested. The present amendments have been entered for the purpose of placing the application into a proper condition for allowance.

Appl. No. : 10/749,180
Amtd. Dated: January 9, 2008
Reply to Office Action of August 9, 2007

CONCLUSION

Claims 1-6 are currently pending and at issue in the present application. Applicant believes all claims are now in condition for allowance. Reconsideration is respectfully requested.

Should any formalities remain which can be corrected by Examiner's amendment, Applicant requests that the undersigned be contacted by phone in order to expedite the prosecution of the present case.

Respectfully submitted,

By 

Robert W. Diehl
PTO Reg. No. 35,118
Seyfarth Shaw LLP
Attorneys for Assignee
131 South Dearborn Street
Suite 2400
Chicago, Illinois 60603-5577
312-460-5000
312-460-7000 (fax)